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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 118

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CORRESPONDENT REPORTS INDIA TO CANCEL TARAPUR PACT

Calcutta THE STATESMAN in English 8 Sep 81 pp 1, 9

[Article by Warren Unna]

[Text]

WASHINGTON, Sept. 7.—The Government of India finally is about to take the initiative in cancelling its 30-year Tarapur nuclear power plant contract with the USA.

This is because India feels that by October 2 the USA, which has been dilly-dallying on its commitments to sell India enriched Uranium to keep Tarapur refuelled, finally will be reneging. India thinks it then will have the legal argument to get out of its own commitment in the contract to refuel Tarapur only from U.S. supplies or U.S.-approved sources.

Indian officials explained here that the USA in its 1963 contract with India, promised to keep Tarapur refuelled over a 30-year period "as needed", and in annual instalments. The last shipment was pushed by President Carter last autumn over strong opposition from the U.S. Congress. President Reagan's repreesntative in nuclear matters, the Assistant Secretary of State, Mr James Malone, made it plain during Tarapur wind-up negotiations in New Delhi in the end of July that it would be impossible to get Congress to approve any more shipment of U.S.-enriched uranium to India so long as India refused to comply with the U.S. Nuclear Non-proliferation Act requiring international inspection of all of its nuclear installations (not just the U.S.-assisted Tarapur).

It is now learned that India has been secretly testing mixed oxide fuel over the past four years in anticipation of the final breakdown of U.S.-enriched uranium shipment. Indian officials are said to feel confident that they can shift Tarapur's refuelling to mixed oxide over a one-year to 1½-year period by slowing down Tarapur's reactors, but not actually shutting them down.

U.S. officials, last year, had warned that India would turn to the Soviet Union for Tarapur's refuelling if Congress didn't permit the continuance of U.S. shipment. But, instead, India seems determined to become self-reliant and no longer dependent on the whims of any foreign supplier.

Also, even though the original Tarapur contract contained a reference to "fuel produced in Tarapur" as an alternate source, U.S. officials felt the uranium oxide route would be impractical and require a shutdown of some three years.

The manufacture of uranium oxide will require India to make use of its reprocessing facilities and involve the use of the plutonium in the fuel rods which is a by-product of the original U.S. supply.

In the original concept of the U.S. "atoms for peace" programme in which non-nuclear nations were urged to develop nuclear power plants with U.S.-enriched uranium fuel, the idea was that these fuel rods would be indeed re-cycled through reprocessing so as to both make the operation more self-sufficient and eliminate the problem of disposing of the radioactive waste from the spent fuel rods.

But in 1978, the U.S. Congress, under President Carter's urging, adopted retroactive restrictions. President Carter and the Legislators feared that there now was a worldwide danger of misusing spent fuel for the development of nuclear weapons and those nations which did not already have nuclear arms might be tempted.

Indian officials think President Reagan's Administration is more "relaxed and realistic" on the issue, and also more pragmatic in recognising that it is unfair to ask India to depend upon further nuclear fuel shipment for Tarapur which now will never come.

India is prepared to have a final round of talks with Mr Malone on winding up the Tarapur contract. It was made clear to him in New Delhi in July that international inspection of even just the Tarapur plant would not be continued with the cut-off of U.S. fuel.

Instead, India is considering either an oral statement or a written declaration assuring the USA that Tarapur's fuel always will be used for peaceful purposes, that no plutonium end-products, even after the contract is severed, ever will be diverted to the manufacture of nuclear weapons.

It is not clear how the USA will respond to this. But India now is convinced that after October 2 it will have the legal right to do whatever it chooses regarding Tarapur since, by then, the USA will have fallen delinquent on its own obligations in the contract.

CSO: 5100/7154

RAO REPORTS CAMPAIGN AGAINST NEUTRON BOMB

New Delhi PATRIOT in English 5 Sep 81 pp 1, 7

[Text] India and other non-aligned countries are taking the initiative to persuade the US against going ahead with its decision to manufacture the neutron bomb, Minister for External Affairs, P. V. Narasimha Rao, told the Rajya Sabha on Friday.

Answering a series of supplementaries, the Minister indicated that Foreign Ministers of the non-aligned countries would hold in depth consultations during the coming session of the UN General Assembly to evolve 'a kind of a general consensus' against the growing stockpile of nuclear weapons and the new devices.

The non-aligned countries, and specially India he said had repeatedly voiced grave concern at the developments and had warned against the growing perils of the nuclear arms race and the dangerous concept of 'limited nuclear war,' that was being promoted by some nuclear-weapon nations.

The Government had repeatedly stated India's commitment to the imperative need for nuclear disarmament leading to total elimination of weapon stockpiles.

Pending such disarmament, India together with the other nonaligned countries had been demanding total prohibition of all uses of nuclear weapons.

As such any use of nuclear weapons will be in violation of the UN Charter and a crime against humanity he added.

Mr Rao told Mr Satpal Malik and Mr N.K.P. Salve that the non-aligned countries were already holding consultations amongst themselves and the Foreign Ministers would consider what initiative was possible and feasible.

It would be India's effort Mr Rao said to work for nuclear disarmament in the UN and all other international forums in bilateral discussions with other governments. He told Mr Salve that opposition to the neutron bomb had to beat the political level.

India, however, wanted to consult everyone at the earliest--which would be before the UN General Assembly--instead of acting in isolation, Mr Dinesh Goswami was told.

The External Affairs Minister shared the concern of the members to the growing stockpile of nuclear weapons, and told Mr Yogendra Sharma that Government would consider in what way Parliament should express itself on an appeal sent by the USSR Parliament to all Parliaments of the world against nuclear stockpiles.

Mr J. P. Mathur said since the Soviet Union also had reportedly decided to manufacture the neutron bomb efforts should be made to persuade both the super powers to desist from taking such a 'suicidal' step.

Mr Rao replied that he was not aware of the Soviet decision. Nevertheless, he remarked that in the prevailing atmosphere of arms race, the Soviet Union would not like to be left far behind.

CSO: 5100/7152

AEC CHAIRMAN DESCRIBES THREE-STAGE NUCLEAR PROGRAM

New Delhi PATRIOT in English 9 Sep 81 p 4

[Text] Bombay, Sept 8 (UNI) India's nuclear energy programme is a three-stage process which will overcome the 'not so good' fuel situation, Atomic Energy Commission Chairman H. N. Sethna today observed while delivering the first lecture of the sixth international conference of women engineers and scientists here.

In the first stage, the 'Candu' type reactor, using natural uranium fuel with heavy water moderator, will be employed. When uranium-235 in the fuel is undergoing fission, some of the uranium-238 in the reactor gets converted into plutonium which is nearly fully fissile material like uranium-235. This will be separated by a chemical process and the plutonium obtained, will be used to fuel fast breeder reactors (to be built in the second stage), he said.

A breeder reactor is one which produces more fuel that it burns. This is achieved by surrounding the reactor with a fertile material like thorium or uranium-238 which absorbs the escaping neutrons and gets converted into a fissile material.

These can be extracted again and again and used to fuel another fast breeder. Thus, building of fast breeders in the third phase will sustain the nuclear energy programme for hundreds of years, Dr Sethna added.

Dr Sethna said fusion energy was the ultimate source that could solve the energy problems of mankind.

With the increased programme of utilising nuclear energy for power production all over the world, he felt that soon this segment alone could provide over 25 per cent of the world's energy requirements.

The known reserves of uranium could meet the energy requirements of the world for a few thousand years based only on fission reactor technology if intelligently exploited, he said. Once fusion reactors became practical, the energy problem could be considered to have been solved forever, Dr Sethna said.

CSO: 5100/7155

STATION TO BE BUILT WITH INDIGENOUS TECHNOLOGY

Bombay THE TIMES OF INDIA in English 6 Sep 81 p 6

[Text] New Delhi, September 5 (UNI)--The fifth atomic power station proposed to be set up at Kakrapar in Surat district of Gujarat will be built with cent per cent indigenous technology.

For the fuel and heavy water the project will not depend on any external agency and the reactors will be outside the safeguard restrictions, according to the latest issue of Nuclear India, published by the department of atomic energy.

Environment protection has been accorded high priority and the project will meet the standard requirements for minimising environmental pollution.

The fuel will be fabricated at the nuclear fuel complex, Hyderabad, in the department of atomic energy, which is being expanded in a phased manner to cater to this and future projects.

The proven reserves of uranium are considered adequate to support the power programme as currently envisaged.

In the sixth plan provision has been made for commencing work on the construction of six such reactors, which will raise the nuclear power generation capacity (under operation and construction) from 1,800 Mw at present to 3,210 Mw by the end of the plan period.

The fifth atomic power station will finally comprise four reactors of 235 Mw each. It has been decided to generally adopt the concept of a four-reactor station at all future sites to enable maximum utilisation of the site infrastructure, according to the department of atomic energy.

CSO: 5100/7153

BRIEFS

NEW URANIUM FINDS--New Delhi, Sept 10--There have been new indications of the presence of uranium in some parts of the country, the Lok Sabha were informed yesterday, reports PTI. However, more details would be available only after the investigations, which are in progress, are completed, Mr C. P. N. Singh, Minister of State for Science and Technology, told Mr Madhavrao Scindia in a written reply. [Text] [Calcutta THE STATESMAN in English 11 Sep 81 p 7]

HEAVY WATER PRODUCTION--India will achieve self sufficiency in heavy water (for atomic power stations under construction) with the commissioning of the Kota and Talcher plants before March, 1982, reports UNI. Minister for Science and Technology C.P.N. Singh told the Lok Sabha that construction of more heavy water plants was planned to meet the needs of future power stations. [Text] [New Delhi PATRIOT in English 13 Sep 81 p 5]

URANIUM DEPOSITS DISCOVERED--A significant concentration of uranium has been found in the Shillong plateau of Meghalaya. Uranium has also been detected in the old crust rocks in some localities of the Garo hills in Meghalaya and the Mikir hills of Assam. [Text] [Delhi Domestic Service in English 0240 GMT 24 Sep 81 BK]

CSO: 5100/2005

SITE SOUGHT FOR NUCLEAR POWER PLANT

Jakarta HARIAN UMUM AB in Indonesian 21 Jul 81 p 3

[Article: "BATAN Ready To Use Nuclear Energy To Power Electric Power Station"]

[Text] Baiquni, chairman of BATAN (National Atomic Energy Agency), said his agency is ready when the government decides to use nuclear energy to power electric power stations in Indonesia.

Responding to a question from the press after having been received by President Suharto at Cendana Street on Monday [20 July], Baiquni said BATAN is still exploring the need to add nuclear-powered stations considering that Indonesia has many sources of energy such as oil, coal, water, and so on to power such stations.

Nevertheless a study made by BATAN, a State Electric Company consultant, and the Board for the Study and Application of Technology concluded that at some later date Indonesia will be forced to use nuclear energy to power electric power stations.

Therefore, Baiquni said, his agency is beginning to look for a possible good site in which to locate a nuclear-powered station complex. In this connection an in-depth study is underway on the selection of such a site. It involves several aspects including population density within a certain fixed radius of such a site.

Selection of a site is very important to prevent undesirable incidents such as nuclear leaks.

When asked about when construction of such a station would begin, Baiquni said it depended on a government decision. "We are just getting prepared against such an eventuality so that when the decision is made, we will be ready," he added.

Regarding the eventual electric power station capability, Baiquni also said it depended on the requirements although a feasibility study done on such a station indicated that it would be capable of producing 60 MW.

Regarding the cost of constructing such a station, Baiquni said it depended on when it would be built, the components used as well as the technical expertise required.

If the station had been constructed in the past (several years ago--editor), it would have cost less because by now components possibly could have been produced domestically and meanwhile technological expertise from abroad could have been replaced with our own manpower.

The BATAN chairman had reported to the chief of state on the implementation of cooperation on technological expertise as well as technology with France, Italy, and other Western European nations.

He said Indonesia had sent 22 experts to France to further their knowledge while sending experts to Italy is still being studied.

6804
CSO: 5100/8115

PROFESSORS SCORE U.S. NEUTRON BOMB PRODUCTION

OW290323 Hanoi VNA in English 0257 GMT 29 Sep 81

[Text] Hanoi, 29 Sep (VNA)--"Reagan's decision to produce and deploy the neutron bomb is to serve U.S. wars of aggression," said Doctor Tran Quoc Thuong of the Vietnam Nuclear Research Institute to V.N.A. on September 28.

Tran Quoc Thuong, who obtained the doctoral degree of atomic energy in France, is now working for the atomic energy service in Vietnam. He stressed that "the neutron bomb is a form of radioactive nuclear bomb which causes not only immediate but lasting effects, both in direct and indirect ways."

"The world public has for many years condemned chemical warfare but the U.S. used chemical weapons during the war in Vietnam. I think that everybody must adept a clear-cut attitude against U.S. production of the neutron bomb, especially in the situation that the Reagan administration is taking a militarist tendency, stepping up the arms race, and using sciences to threaten world peace," he said.

Doctor Phan Van An of the Vietnam Institute of Sciences, who previously studied in the Soviet Union and Bulgaria, said: "The neutron bomb, which is very different from the U.S. Government's statement, is a weapon used in attacks, land occupation and mass killing." He added: "We energetically oppose the U.S. decision to produce the neutron bomb, because its purpose is completely inhuman and against sciences."

For his part, assistant professor Luu Tien Hiep, who obtained the doctoral degree of chemistry in Australia and is now teaching at the polytechnic in Ho Chi Minh City, said: "The U.S. imperialists, who used atomic bombs in Japan, must be condemned by all people, and strong measures must be taken to oppose the U.S. production of the neutron bomb."

He said: "As A. Einstein and his colleagues and the peace-loving people have strongly protested against the use of atomic bomb, I hope that the scientific circles and the majority of the American people must be the first to adopt adequate actions against the U.S. present production of the neutron bomb."

CSO: 5100/4501

BRIEFS

HEAVY WATER PLANTS--Buenos Aires, 23 Sep (TELAM)--Dan Benningson, director of the National Atomic Energy Commission [CNEA], said at Ezeiza Airport, in reply to a question asked by newsmen if the public expenditure cut would affect the Argentine nuclear program, that any cut has some effect, but that the progress of all programs continues. Benningson arrived today after participating in a technical meeting in Germany during which the limits of releasing radioactive material in the environment were discussed and various technical methods to limit the discharge of such material in the atmosphere were made known. Benningson referred to the building of heavy water plants, saying that two such plants are now under construction. One is a small plant being built with Argentine technology: a pilot plant which will serve us--after it starts functioning--as the basis for another bigger one in the future which is under construction near the Atucha nuclear center. There is another, the industrial plant with Swiss technology, being built by the Schultzer Company at Arroyito in Neuquen Province. This plant will produce 250 tons of heavy water per year as of 1984. [Text] [PY242033 Buenos Aires TELAM in Spanish 1558 GMT 23 Sep 81]

CSO: 5100/2005

LOADING OF ANGRA I REACTOR AUTHORIZED BY CNEN

Rio de Janeiro JORNAL DO BRASIL in Portuguese 16 Sep 81 p 23

[Text] Brazil will enter the nuclear age this weekend. The CNEN--National Nuclear Energy Commission--authorized FURNAS [Brazilian Powerplants] to load the core of the Angra dos Reis Powerplant No 1 nuclear reactor with the 50 tons of fuel elements which will be burned to generate "nuclear steam heat." However, it will not be until the end of November that power generated by the nuclear powerplant will go on line into the electrical system of the Southeast.

The information was provided by FURNAS President Licinio Seabra, who expects that the operation of the powerplant will not cause an increase in electric power rates--at least not in the short term--to help defray the $1.3 billion cost of the first Brazilian nuclear powerplant.

Greater Costs

Seabra said that at the end of November, after the conclusion of the critical tests, the phase which follows the loading of the core, the powerplant will begin to operate at only 10 percent of its nominal operating capacity of 620 megawatts. He expects that in March next year the plant will reach its full capacity of 100 percent in keeping with the following percentages: 30 percent, 50 percent, 75 percent and 90 percent. Thereafter, "If nothing unforeseen happens," as Seabra observed, the plant will continue to generate at 70 percent of its capacity, the average operation. The FURNAS president expects the DNAEE--National Water and Electrical Power Department--to seek ways of recovering the costs of the nuclear powerplant. He believes this will take place, perhaps even in an overall way, because the leaders of the electric power sector are trying to obtain a remuneration of 10 percent for the companies in order to balance the energy sector.

Seabra admitted that the repayment of the costs of the Angra dos Reis Powerplant No 1--higher between 20 and 30 percent than those of hydroelectric powerplants--will take place only in the next 20 to 25 years, the useful life of a nuclear powerplant.

The FURNAS president also said that the loading of the core with fuel elements takes from three to four days. However, if during the course of the critical tests some abnormality takes place, the powerplant will be shut down because, according to him, the important thing "is its safety."

Construction on the Angra dos Reis Powerplant began in 1972. Its cost at that time was budgeted at a little less than $400 million, a cost of $300 per kilowatt installed. That same kilowatt almost 10 years later costs $2,000. The 50 tons of fuel cost FURNAS nearly $30 million at 1978 prices.

As of January next year, when the powerplant will be generating power at its full capacity, FURNAS will begin to concern itself with its reloading, which will take place 14 months later. The powerplant will be down for at least a month so that one third of its spent fuel can be removed.

Seabra reported that Westinghouse, after acceptance of the powerplant by the CNEN as being ready to operate, will remain on-site for one year observing the operation of its equipment. This is the warranty period. Up to December, after the loading of the reactor core, some intermediate tests will still be run: precritical, low power (physical), stationary power, power (transient) and acceptance. The symbolic pre-inauguration of the powerplant, with a low-key ceremony, will take place next Tuesday and will be attended by Minister of Mines and Energy Cesar Cals.

8908
CSO: 5100/2332

CONCRETE FOR REACTOR BUILDING SLAB FINALLY POURED AT ANGRA II

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 16 Sep 81 p 25

[Text] With a delay of three years and costs of 7.5 billion cruzeiros just for the completion of its foundations, the Angra II nuclear powerplant yesterday began pouring concrete for the slab on which the reactor building will be built. The slab, which is costing 240 million cruzeiros, will be poured within three days but will only be in a condition to receive the reactor building in November.

The superintendent of the NUCLEBRAS [Brazilian Nuclear Corporations] Nuclear Powerplant Construction Corporation (NUCON), Emilio Claudio Leme, declared yesterday at Angra dos Reis that the corporation budget for 1981 was estimated at 43 billion cruzeiros, but he did not reveal how much has been paid up to now, limiting himself to saying: "I am already receiving that money."

Emilio Lemes, who previously denied the participation of the Norberto Odrebech Company in the Angra II project, reported that the company will build the infrastructure of that powerplant, with the rest of the civil construction being done by companies whose qualifications are being checked.

Technicians of the nuclear sector explained yesterday in Angra dos Reis that the Norberto Odebrecht Company will transfer the technology it obtained from the German company Hotchieff to other construction companies, which are going to be working in Angra III, if it is paid the sum of $100 million. This amount, according to the same technicians, is the equivalent of what a foreign company would charge at this time for providing the technology of nuclear powerplant civil construction. A serious technical problem brought to the attention of those technicians is that NUCLEBRAS did not even receive half of the 107 billion cruzeiros of its 1981 budget, and it is not in a condition to carry out its programs. Angra II is now working on the slab for its nuclear reactor building, while Angra III will not have its infrastructure ready until October 1982.

Stocked Material

The technicians believe that the Angra II difficulties will not change much. Of the 300 piles of the reactor site, 88 were built to reinforce the foundations at a cost of an additional 440 billion cruzeiros [as published, presumably 440 million]. Each piling cost 500,000 cruzeiros and the 300 pilings cost 1.5 billion cruzeiros all together. Total cost of Angra II according to Emilio Leme,

will be 30 billion cruzeiros. Counting technicians, administrative personnel and laborers, there are 180 men working at the powerplant site at this moment.

Yesterday, NUCON checked the qualification of nine firms which bid for the work at Angra II; the results should be reported this week. They are: Camargo Correia of Sao Paulo; Andrade Gutierrez, Minas Gerais; Mendes Junior, Minas Gerais; Cetenco Sao Paulo; Servix, Sao Paulo; Alcino Viera-Convap, Minas Gerais; Guaranta, Sao Paulo and Constran, Sao Paulo.

8908
CSO: 5100/2332A

BRIEFS

NUCLEAR PLANT OPERATIONS--Two hundred-ten billion dollars and 10 years later, Brazil will enter this week into the closed club of atomic-energy-generating countries. The Angra 1 plant's generator core has been charged with fuel elements since yesterday so that it can start generating steam by Tuesday [22 September]. In December this steam will be used to drive the electric energy generators. The first nuclear plant goes into operation at a time in which Brazil does not even use up all the energy being generated by the hydroelectric plants. The government is then justifying the nuclear program as a strategic necessity. For the scientific community, there are less-expensive alternatives if the objective is to produce atomic bombs. [Text] [PY240123 Rio de Janeiro JORNAL DO BRASIL in Portuguese 20 Sep 81 p 1]

GOVERNMENT TO SELL URANIUM--Rio de Janeiro, 23 Sep (AFP)--Brazilian Mines and Energy Minister Cesar Cals today announced that Brazil will finance its nuclear program with the exports of enriched uranium that will start in the decade of the 90's. Cals said that the construction of an industrial complex to produce uranium will start in 1982 [words indistinct] the type of enriched uranium that will be produced in Brazil. Cals also said that the Brazilian nuclear plant--being implemented under the framework of the nuclear agreement signed with the FRG--will require an investment of $25 to $26 million. This program includes the complete chain of necessary operations for uranium prospecting its extraction, treatment and the installation in Brazilian territory of a nuclear reactor factory, a plant to produce nuclear fuels and another for the treatment of radioactive fuels. Cals said during a visit he made to the first Brazilian nuclear plant that the Brazilian nuclear program is sovereign and has exclusively peaceful goals. [Excerpts] [PY241209 Paris AFP in Spanish 1758 GMT 23 Sep 81]

CSO: 5100/2005

BRIEFS

URANIUM DEPOSIT FOUND--The director of the mining institute has reported that a uranium deposit has been found in Chile. He did not report, however, where this deposit is found or how vast the uranium deposit is since he said that there are industrial secrets. He said that this is the first time a uranium deposit has been found in Chile. He noted that this was the result of about 20 mining explorations being carried out in Chile. [Santiago Chile Domestic Service in Spanish 1730 GMT 23 Sep 81 PY]

CSO: 5100/2004

FRANCE, IRAQ DISCUSS REBUILDING REACTOR

London 8 DAYS in English No 34, 29 Aug 81 p 56

[Article by Howard Schissel]

[Text]

THE VISIT to Paris on 19-20 August of the Iraqi deputy premier, Tariq Aziz, enabled France and Iraq to open up a constructive dialogue over the eventual French participation in the reconstruction of the Tammuz nuclear research centre. The Iraqi leader met President Francois Mitterrand, Prime Minister Pierre Mauroy, Defence Minister Charles Hernu and Minister of Foreign Trade Michel Jobert.

The new French government sees little reason why it should refuse Baghdad equipment for the peaceful use of nuclear energy when it is being supplied readily to a growing number of countries in the Third World.

Negotiations between the two capitals on this issue could get under way in the near future. However, *8 Days* has learnt that France will insist on an unprecedented series of safeguard clauses.

The most important will probably involve the replacement of the highly-enriched uranium originally specified to power the Tammuz reactors by a low-grade fuel known as 'caramel' which is practically impossible to convert to military use. In the past, the Iraqis have systematically rejected such a suggestion and it could become a serious sticking point.

But Baghdad is not without leverage in the difficult talks. For example, Saudi Arabia has declared that it would finance, if necessary, the rebuilding of the Tammuz site. If the Saudis put pressure on President Mitterrand during his state visit to Riyadh at the end of September to honour the original contracts, it would indeed be delicate for France to propose a new accord which satisfies neither the Saudis nor the Iraqi leaders.

From the economic point of view, Iraq could threaten to end its special oil relationship with France: the ten-year cooperation agreement with the state-controlled oil concern, Compagnie Francaise des Petroles (CFP-Total), comes up for renewal in June 1982. In 1980, CFP lifted 13m tonnes of Iraqi crude, and certainly does not want to lose this precious source of oil, once the country's hydrocarbon industry gets back to normal.

French firms are particularly interested in winning contracts in Iraq's economic development programme as well as to participate in the reconstruction of the country when the war with Iran is over.

Iraq has been one of France's best clients for modern arms systems in the Middle East during the past decade, and the Mitterrand government dearly wants to maintain this precious link.

The Iraqis, for their part, could use the prospect of future arms deals as an added form of pressure. Paris intends to sell its new generation single-jet fighter, the Mirage 2000, to Iraq and it would also like the Iraqis to participate in the financing of the twin-engined Mirage 4000.

Thus the forthcoming Franco-Iraqi negotiations on the reconstruction of Tammuz will be an acid test of the Mitterrand government's intentions in the Middle East. The outcome of these talks is likely to affect more than just Paris's ties with Iraq.

CSO: 5100/4701

SELF-SUFFICIENCY IN NUCLEAR REACTORS SOUGHT; NEW NUCLEAR POWER PLANT

Nuclear Energy Chief Profiled

[Article by Berna Maree: "Cabinet Maker Becomes Nuclear Chief"]

Johannesburg DIE TRANSVALER in Afrikaans 1 Sep 81 p 11

[Excerpts] Pretoria--Dr. J. W. L. deVilliers nuclear physicist, member of the South African Institute for Physics and of the South African Institute for Mechanical Engineering and also registered professional engineer, became president of the Council on Atomic Power in 1979.

Preference

His new position as chairman of the controlling board, which will combine and control the activities of the Council on Atomic Power and the Uranium Enrichment Corporation, was announced at the end of July by the minister of Minerals and Energy Affairs, Mr. F. W. deKlerk.

Dr. DeVilliers is a scientist with a wide range of interests and woodworking is said to be his chief predilection.

Dr. DeVilliers is optimistic on the future of nuclear development in South Africa. His present complaint is the great shortage in trained personnel...a phenomenon which South Africa has to cope with on a wide front. In the Nuclear Science area he estimates this to be nearly 20 percent.

Dr. DeVilliers regrets the fact that, because of this shortage, highly specialized people must often perform timewasting routine tasks which can be performed just as well by persons who have not undergone such an intensive and greatly demanding training.

His greatest ideal is to see South Africa completely self-sufficient in the area of its nuclear energy requirements. But for the time being this is impossible, although future plans are directed toward this aim.

A serious study is now being made of the possibility of manufacturing sufficient nuclear fuels locally to fill the country's requirements. When the Koeberg power plant at Capetown goes into operation in the first half of 1982 South Africa will still be dependent on other countries for its fuel requirements.

Matters which require serious consideration are the completion of the nuclear fuel cycle and the establishment of an industrial technology aimed at making it possible for South Africa to build its own nuclear reactors.

In the meantime South Africa is deriving great advantages from what has already been achieved thus far. Production of isotopes for medical purposes is making great contributions in medicine, while it has already been proven that nuclear technology is eminently suited for many applications in agriculture and industry.

Research in marketing irradiated foods is in an advanced stage and irradiation treatment of animal products is also enjoying continuous attention.

At an international level we are collaborating "with all those countries which are willing to collaborate with us on the peaceful application of nuclear energy," so stated Dr. DeVilliers. Scientists seldom experience problems among themselves. Where problems do arise are in those instances where international politics are injected into nuclear matters.

With respect to reports of a nuclear explosion by South Africa, a smiling DeVilliers said: "This is pure speculation."

Country Boy

The 52-year-old Dr. DeVilliers has come up a long way on the road to scientific development and nuclear physics. Born in the Free State, a country boy in Smithfield's world, he was introduced to the scientific career when he went to school. At that time he built radios and kept himself busy with electronic equipment.

After his first year of having obtained the BS degree at the Free State University, Dr. DeVilliers went to the University of Stellenbosch where he acquired the MS degree (cum laude) in 1951. From 1952 to 1958 he worked at the Council for Scientific and Industrial Research in Pretoria. In 1957 he acquired a doctor's degree at the University of Stellenbosch.

In 1958 Dr. DeVilliers held a scholarship from the Council on Atomic Power and after additional training and research at well known institutions such as the Argonne and Brookhaven National Laboratories in the United States, he returned to the Council on Atomic Power in 1962 and in 1967 he became the director of the council's Division for Reactor Development.

He has written about 25 scientific publications.

Dr. DeVilliers is the father of four children, two boys and two girls, one of which is already married.

Site of Second Plant

Johannesburg DIE TRANSVALER in Afrikaans 1 Sep 81 p 2

[Text] Capetown--South Africa's second nuclear power plant will possibly be built in the Eastern Cape between the Kowien Tsitsikam River, according to a report by the South African Press agency.

The Coordinating Council for the Protection of the Environment in the Eastern Cape has been asked by the Electricity Supply Commission to provide comments on possible places where an additional nuclear power plant can be built and Dr. T. Woodridge, a member of the council, has stated that a comprehensive report has already been sent to the Electricity Supply Commission.

If the Council's advice is accepted such a power plant will certainly be built west of Cape Saint Francis between Jeffry's Bay and Plattenberg Bay.

Dr. Woodridge says that the area is thinly populated and has an open coastline with strong sea currents necessary for dispersing waste.

Regions such as Algoa, which are protected, must be avoided as are also thickly populated areas such as the coast close to Port Elizabeth.

Still another consideration is that a strip of land of about 1 kilometer in width is necessary for connecting the nuclear power plant onto the national network.

The council has asked the Electricity Supply Commission for a complete environmental study before the final decision is made.

Dr. Woodridge said that it is general knowledge that people who are dedicated to the preservation of the environment are not happy with the location of the Koeberg power plant.

Mr. Boet Uys, a liaison official of the Electricity Supply Commission, has confirmed that a study has been initiated on other possible sites where nuclear power plants can be built.

7964
CSO: 5100/4968

BRIEFS

SECOND NUCLEAR PLANT SITE--Cape Town--South Africa's second nuclear power station will be situated between the Kowie River and the Tsitsikama River on the east coast, probably west of Cape St Francis. This became apparent after Escom had asked the Co-ordinating Council for Nature Conservation in the eastern Cape to give possible sites for the second atomic power station between Port Alfred at the Kowie River mouth and the mouth of the Tsitsikama River. Dr T Woolridge of the CCNCEC said an extensive report had been submitted to Escom on possible sites. He said the area had a sparse population and an open coastline with strong currents necessary to dispel outfall. Areas to be avoided were sheltered bays, such as Algoa Bay and Francis Bay, and high-density areas such as the coast near Port Elizabeth. The CCNCEC also thought a corridor about a kilometre wide was necessary to link power lines from the station with the national grid. The corridor for the power lines from the station should not run through areas where it would destroy natural vegetation. "The coast west of Cape St Francis is the least sensitive area under consideration," said Dr Woolridge. [Text] [Johannesburg THE STAR in English 1 Sep 81 p 4]

CSO: 5100/5601

AERIAL SEARCH FOR URANIUM DESCRIBED

Salisbury BUSINESS HERALD in English 24 Sep 81 p 14

[Selection from feature "Mining Survey" compiled by Andrew Whaley entitled: "Target--Uranium: The Search Is on From the Air"]

[Text]

FLYING in a Dakota at an altitude of 100 m, up to 10 hours at a stretch, and on flight lines that vary from as little as 5 to 40 km, may seem a little like going round in ever-decreasing circles.

But it is actually the basis of one of the most sophisticated "prospecting" operations being conducted in Zimbabwe.

Geological exploration has come a long way from the proverbial bearded prospector scouting the wilderness with his donkey for valuable minerals.

Today the airborne search can save time and, in the long run, money; particularly when one is looking for "elusive targets" spread over vast areas.

A number of companies are undertaking such an operation in the Kariba and Wankie area, in the search for uranium, base metals and other geological data.

A senior geophysicist with one of these companies, Mr Eddie Kostlin, who is supervising the search, summed it up this way: "You can fly in one day what a guy on the ground would probably take several weeks to survey."

This particular operation has a team of eight — two pilots, a navigator, one technical operator (all of these actually work in the Dakota during the survey); and two data compilers, a geophysicist and an engineer, who normally stay on the ground.

"You have to have people who can get on with each other," Mr Kostlin said, particularly as they spend long hours in the air together under conditions of limited movement.

"Normally on a survey, there is a good team spirit. After all, you are sitting up in the air facing the same dangers of droping out of the air," he said.

But quite apart from the necessity of a team spirit, a sophisticated operation of this kind carries another and more pressing problem: accuracy.

Instruments have to work properly and the data has to be readable for accurate analysis.

And this is where the team work really starts.

It means that the pilot has to fly straight on a flight line — no mean feat in a lumbering Dakota which has to be held at a height of 100m.

Although the survey may require a flight line as long as 300 km, the present operation over the Zambezi escarpment is being carried out on lines from 5-40 km which means that the pilot has to fly out and back at short intervals over another flight line 800 m apart.

The navigator has a vital function in helping here. He has to make sure that valuable ground is not lost by incorrect spacing and zig-zagging flight lines.

In fact, a few days of time and money might be lost through re-flights at the end of the survey, if this aspect of the survey is not carried out accurately.

Mr Kostlin has always insisted on a navigator for this reason. "otherwise the navigation goes skew, lines go skew and the altitude is not kept constant".

Often airborne surveys done in smaller planes do not have space for a navigator, Mr Kostlin said. "That is one of the reasons why I prefer to use a Dak."

A fourth person on the plane is responsible for the intricate handling of the instruments. He is the operator, a very specialised technician.

His basic concerns are for the magnetometer, the spectrometer — which is like a sting in the Dakota's tail — and the automatic camera.

The magnetometer, as it suggests, picks up magnet responses from ore bodies, and from this records analogically and digitally.

From these readings, a magnetic contour map can be prepared either by computer or manually, Mr Kostlin said, and "anomalies like highs and lows" can be deduced.

Since the early 1950s geologists and physicists have learned to approach the data given by these magnetometers with far greater awareness and knowledge, he said.

Even more advanced is the spectrometer which then computes readings into a radiometric contour map locating certain radio-active deposits.

In addition, the spectrometer can provide information for what are called "stacked profiles", which give the exact potassium, thorium, uranium or total count of radio-activity in a specific area.

The operator sees that these instruments are functioning accurately and it is his job to ensure that the "noise" level from the plane or from outside, does not interfere.

"Magnetic storms, which are caused by sun spot activity, can last from anything from a few minutes to a few days. This can also affect the survey," Mr Kostlin said.

Lightning is a disaster to a survey because "spikes" occur on the recordings.

And then there is the human control of the pilot whose speed and altitude have to be checked very carefully.

"If he flies too fast we are going to miss something," Mr Kostlin said.

With a magnetometer reading every second, the pilot has to maintain an optimum speed to allow one reading every 50 m, he added.

The operator is also responsible for maintaining checks on the camera in the back of the plane which, as Mr Kostlin put it, "shows you where you have been".

This is not as mundane a sentiment as it sounds at first. Very often wind and drift can cause jumps in a flight line.

It is, therefore, necessary to complete an accurate mosaic of numbered and integrated photographs which can pinpoint exactly the geological targets.

The two data compilers in the Anglo American project are responsible in their own way for achieving this. They prepare the flight paths, develop the film and edit the recordings.

Said Mr Kostlin: "Flying 1 200 or 1 300 km a day, there is a fair amount of data to compile. They have to be up to date. Sometimes it means working in the night to get the facts ready for the following morning's flight."

And after the survey? After the weeks of escarpment heat and exacting work under confined conditions?

The data that has been collected can take from six weeks to two months to draw up final maps and make sense of the information.

That job finally rests with Mr Kostlin as geophysicist.

"I have to see that the job gets done as efficiently as possible," he said. "I have to look at the recordings and start some evaluation, an interpretation in the field as soon as possible, although I will start major work in the office."

Mr Kostlin is adamant that the only way to conduct these surveys is in a Dakota. It allows greater space, has a greater fuel capacity (and therefore can do longer runs more productively and efficiently) and it also has enough room for two bulky gamma ray detecting crystals.

"Besides," he said, "on a small plane normally you have to have a vehicle following, but on a Dakota you can carry it all with you."

"There are lots of challenges in getting the exercise together, in getting the team together," he added.

"These people are rare animals," he said about his colleagues on the survey. "Normally electrical boffins want to sit around in labs and fiddle with oscilloscopes."

But carrying out spot-on surveys in the field is a different proposition and one which requires a specialist approach to the conditions that apply there.

For instance, in the case of the pilot, Mr Kostlin remembers one occasion when he hired a Jumbo pilot to fly in a straight line at an altitude of 100 m.

"He was fine flying Jumbos at 30 000ft, but we had skew lines..." he went on.

And is he hopeful of finding uranium?

"You must always be hopeful. Anybody who looks for minerals must be hopeful. There is always something to give you hope.

"There are always lots of indications of mineralisation around the show, although a lot of them come to nothing. But you must have hope otherwise you cannot do your job."

CSO: 5100/5600

POLL SHOWS CONTINUED OPPOSITION

Copenhagen BERLINGSKE TIDENDE in Danish 14 Sep 81 p 7

[Article by Asger Schultz, director, Gallup Institute: "Continued Preponderance of Opposition Against Nuclear Power"]

[Text] In a continuing series of polls of public opinion concerning the introduction of nuclear power in Denmark, the Gallup Institute asked the following question of a representative group of adults: "The Folketing has postponed the decision to build nuclear power plants in Denmark until a sufficiently safe means has been found to store nuclear wastes. If or when the Folketing at some time believes that this problem is solved, and decides to build nuclear power plants, this question will possibly come to a popular vote. In a popular vote will you vote yes or no to nuclear power?"

The most recent poll was conducted in August 1981, and the following table shows the results of this latest poll plus for comparison the results of previous polls, including the results of the last poll before the Harrisburg accident, which took place in March 1979.

	Dec 1978	Apr 1979	Jun 1979	Sep 1979	Jan 1980	Jun 1980	Feb 1981	Aug 1981
	%	%	%	%	%	%	%	%
Vote for	39	30	32	36	37	37	39	36
Vote against	38	54	51	46	44	41	47	48
Don't know	23	16	17	18	19	22	14	16
Total	100	100	100	100	100	100	100	100

The shock after Harrisburg is clearly evident in a comparison between the figures for December 1978 and April 1979. The number of supporters was reduced by one-fourth (from 39 percent to 30 percent) while the number of opponents was increased by almost 50 percent (from 38 percent to 54 percent), with the result that an absolute majority opposed nuclear power in Denmark, whereas the result before the Harrisburg accident was almost a "dead heat."

After the accident the differences gradually evened out, and later the number of supporters rose to the level of before the Harrisburg accident, almost 40 percent of the population.

On the other hand, the opposition seems to have stabilized at a considerably higher level than before the accident. At that time it was less than 40 percent, but now it seems to have stabilized at a level nearer 50 percent.

As the comparison is somewhat disturbed by the changing "don't know" percentages, the following table shows the division between supporters and opponents when the "don't know" answers are disregarded.

	Dec 1978 %	Apr 1979 %	Jun 1979 %	Sep 1979 %	Jan 1980 %	Jun 1980 %	Feb 1981 %	Aug 1981 %
Vote for	51	36	39	44	46	47	46	43
Vote against	49	64	61	56	54	53	54	57
Total	100	100	100	100	100	100	100	100

It is evident that the effect of Harrisburg has apparently been that the "don't know" percentages became smaller, and the small relative majority or "dead heat" has been changed to a clear majority against nuclear power in Denmark.

9287
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COMPETITIVENESS OF NUCLEAR POWER DOCUMENTED, PROJECTED

Paris L'USINE NOUVELLE in French 10 Sep 81 pp 70-71

[Article by Claude Goudier]

[Text] When the in-depth debate requested by Francois Mitterrand on the future of the current nuclear energy program takes place in the National Assembly in October, the proponents of this program will have a weighty argument in hand to support their position from the economic standpoint: The competitiveness of nuclear energy continues excellent as compared with fossil energies.

The EDF [French Electric Power Company] and the AEC [Atomic Energy Commission] have just completed a study that updates the cost per kilowatt-hour [kW-hr] of nuclear energy. This cost, as of 1 January 1981, comes to 15.69 centimes, whereas that of energy obtained from desulfurized coal comes to 55.35 centimes per kW-hr. These costs are based on plants scheduled to be put into industrial service in 1990.

Considerable Upgrading of Safety

The analysis of electrical energy production costs is an arduous undertaking. More and more precise data on the different components of this cost are becoming available today, however, particularly as regards conventional assumptions. "Thus," explains Jean Bergougnoux, deputy chief of the EDF's Economic Studies Service, "in the investments domain, EDF calculations are based on the same worth-conversion rate as the Plan, or 9 percent per annum. Amortization of the plants is calculated in equal annual installments over a period of 21 years, and the comparison between nuclear plants and conventional thermal plants is based on full operation, that is, constant use, except, of course, malfunctional and maintenance outages. The cost per kilowatt produced by a plant is taken to be the sum of its investment, operating and fuel costs.

Expressed in francs per kW-hr, the investment cost is calculated by taking as a reference a plant put into service in 1990 (two 1,300-MW [megawatt] sections for the nuclear case, or two 600-MW sections for the fossil fuel case). It includes all construction costs, and interim interest charges as well as an allowance for dismantling in the nuclear case. As of 1 January 1981, the cost per kW is found to be: for the nuclear case, Fr 4,850; for the coal-fired, Fr 3,725; and for the oil-fired, Fr 3,100.

The rise in the cost of nuclear energy in the course of the years has been substantial (in 1978, its cost was Fr 2,840). It is owing essentially to the considerable upgrading of safety. Added to this is the factor of a skilled labor component whose salaries climb steadily year by year, and that of sites, which are becoming scarcer and therefore more costly.

As for the operating costs--Jean Bergougnoux continues--the calculation is simple: They are broken down into average annual fixed costs and proportional costs (wages of regular plant staff, maintenance, taxes, technical and administrative expenses). In the case of nuclear energy, these costs represent Fr 181/kW/yr; in that of coal, Fr 180; and in that of oil, Fr 161.

What Will Have To Be Paid Between 1990 and 2010

As regards the third component of the cost per kW--the fuel cost--its analysis is complex, in that, in the nuclear case, several industrial operations are involved, from the mining of the uranium to its reprocessing. A distinction must be drawn therefore under three major headings: The extraction and concentration of the ore in the form of oxide; the enrichment and fabrication of the fuel elements; and the reprocessing of this fuel (recovery of the plutonium and storage of the wastes).

"Uranium market prices, as we know," says Jacques Baumier, assistant to the head of the AEC's Programs Department and head of its Economic Affairs Section, "have collapsed recently, plunging from $48/lb in 1979 to $25/lb. But what concerns us is the price we will have to pay for this mineral between 1990 and 2010. Here, the estimates of the experts vary widely. Some expect a turnabout in the situation, others think the current slump will continue. As far as we are concerned, we think that by 1990 the price will be around Fr 500 ($48) per kilogram, which is the level we are currently using in our calculations."

Before its enrichment, the uranium concentrate must undergo a process called conversion or fluorination. This is a physico-chemical operation that has been thoroughly mastered by Comurhex, a subsidiary of PUK [Pechiney-Ugine-Kuhlmann], the cost of which comes to Fr 31/kg of uranium.

After conversion to a hexafluoride, uranium must be enriched, a prerequisite for its use in light-water reactors. The two varieties or isotopes comprising the uranium must be separated, in order to concentrate the fissile one. This is a "service" operation performed in the vast plant operated by EURODIF [European Diffusion Agency] at the Tricastin site, involving the complex notion of the UTS [separative work unit]. Practically 4.31 UTS's are required to obtain 1 kg of 3.25-percent enriched uranium from 6 kg of natural uranium. The projected cost of this service by 1990: Fr 660/UTS.

After enrichment, the uranium must be processed for assembly into metallic cladding tubes that will constitute the core of the reactor. A company linked to PUK and to COGEMA [General Nuclear Materials Company] processes this fabrication, the cost of which was, in January 1981, Fr 1,045/kg. Based on assumptions of substantial technical advances and increased production capacities, EDF projects a drop in this cost to a bottom price of Fr 740/kg.

Nuclear and Conventional Thermal Energy Production Costs
(as of 1 January each year)

Worth-conversion rate	10 percent				9 percent	
Actualized potential operating time	54,100 hrs			53,000 hrs	56,900 hrs	
Year	1974	1975	1976	1977	1978	1981
Investment cost (Fr/kW):						
Nuclear	1,380	1,900	2,100	2,650	2 840	4,850
Thermal (mean)	830	1,090	1,200	1,500	2,350	3,400
Actualized potential mean cost (centimes/kW-hr):						
Nuclear:						
Investment	2.6	3.5	3.9	5	5	8.48
Operation	1.0	1.2	1.7	1.8	1.9	3.04
Fuel	1.3	1.8	2.1	2.7	3.5	4.17
Total	4.9	6.5	7.7	9.5	10.4	15.69
Conventional thermal:						
Investment	1.5	2.0	2.2	2.8	4.1	6.54
Operation	0.9	1.1	1.4	1.5	2.0	3.07
Fuel	7.1	7.3	8.0	9.1	8.7	15.00
Total	9.5	10.4	11.6	13.4	14.8	24.61
Nuclear/coal ratio	0.52	0.63	0.66	0.71	0.70	0.63

Source: EDF.

Despite a substantial rise in investment costs, essentially owing to safety measures, the competitiveness of the nuclear-generated kilowatt-hour is not breached.

After burnup in the plant's nuclear boiler, this fuel must be reprocessed in COGEMA's plant in The Hague. This is an operation that requires extraordinary precautions, since the material being handled is highly radioactive. In the light of subsequent experience, it is clear now to the EDF and the AEC that the cost of this reprocessing has heretofore been grossly underevaluated: The estimated costs have had to be multiplied by factors of three or four in terms of real value over the following 5 or 6 years. The resultant figure today is Fr 4,000/kg.

Jacques Baumier for his part considers it the better part of prudence to use a figure of Fr 4,200 (the Peon Commission worked on the basis of Fr 1,500/kg as of 1 January 1977...).

Adding together all these fuel cycle costs, the result is a mean overall fuel cost of 4.17 centimes/kW-hr for the year 1981, which compares favorably with 15 centimes for coal and 43.43 for residual fuel, based on current crude oil and coal prices. Based on these different parameters, the total actualized potential production cost for the plant is calculated; that is, the investment cost as of the time it is put into service is added to the actualized potential total of fuel expenditures, in constant francs, using the Plan's actualization rate of 9 percent annually, and the sum is divided by the actualized potential mean operating time to obtain the production cost per kW-hr, which for the above cited nuclear plant is 15.69 centimes. Based on the currently known economic conditions for 1990, the economic superiority of nuclear energy is overwhelming, and the cost of a fossil-fueled plant for the production of energy is fundamentally unjustifiable. A similar calculation based on the economic conditions of 1973 resulted in an approximate equivalence between fossil-fueled and nuclear energy production. Coal may seem attractive, but considering French supply conditions this energy source is definitely more costly than uranium as a primary source of electric power production.

This profound change in conditions governing the production of electricity will make the nuclear more and more the national choice as an energy source, whose cost is certain to be freed of constrictions as world market prices for oil products continue to rise and whose competitiveness is bound to continue growing.

9399
CSO: 5100/2327

PROJECTS TO BUILD NUCLEAR POWERPLANTS DESCRIBED

Madrid LUZ Y FUERZA in Spanish May-Jun 81 pp 5, 7, 9

[Text] "We are convinced that the solution here and now entails nuclear energy." With this comment, made at the press conference held yesterday in Almaraz (Caceres) after the official opening of the first group of the nuclear powerplant, President Calvo Sotelo confirmed his government's steadfast intention of proceeding ahead, unhesitatingly, with the nuclear program called for in the National Energy Plan [PEN]. He subsequently stated that, with the visit to the Almaraz nuclear powerplant, "I wanted to underscore the importance that the government attaches to the execution of the National Energy Plan, and as part of it, to the nuclear plan."

Mr Calvo Sotelo also remarked that the Ministry of Industry and Energy would submit a new version of the PEN to reinforce the nuclear plan, in keeping with the new national energy circumstances. The head of the government asked the news media to help disseminate the information regarding the major safety measures for the nuclear powerplants, making them safe to construct anywhere because, he said, "The vigilance and security standards are extremely stringent. A few days ago, I swore in the Nuclear Safety Council, and we shall see to it that the safety measures, which are very demanding insofar as nuclear energy is concerned, are complied with."

When asked when the revision of the PEN will be made, President Calvo Sotelo noted that, included in the reasons prompting the revision of the Plan is the fact that the prices of crude have changed, and the situation must be geared to the new costs of oil. In this regard, he said that this revision might be submitted by the minister of industry and energy to the Cortes this coming September.

He was later asked whether his government is considering putting the nuclearization of Spain to a referendum and, specifically, the case of Lemoniz; to which Mr Calvo Sotelo replied that he did not consider it a topic to be put to a popular referendum. At another juncture, the president declared that the differences between the government and the opposition parties on the nuclear issue are not very great and that, in any event, "My government (he reiterated) will attempt to comply faithfully with the revised plan." He added: "I am greatly concerned about our delay."

These delays which the minister of industry regrets are causing, and have already caused enormous losses for the national economy; and these losses have had immediate repercussions on the electric companies building the nuclear powerplants. The very delay in this first group at Almaraz has, in the opinion of the president of Spanish Hydroelectric, the Marquis of Casa Oriol, imposed on that firm an impact of 3.7

billion pesetas during 1979, the date on which this first Almaraz group was scheduled to have gone into service.

This loss on the part of HE [Spanish Hydroelectric] must be multiplied by three, because, as everyone knows, the Almaraz powerplant is being built in equal proportions by HE, UE [Electric Union] and CSE [Sevillian Electricity Company]. But this impact sustained by HE that the president of Spanish Hydroelectric has mentioned to us was calculated at 8 billion in 1980, a figure also multiplied by three; which, of course, represents a considerable loss to the nation owing to the delay in the construction of this powerplant, for which the electric companies building it are certainly not to blame.

The benefit accrued to the Spanish economy by the entry into service of this first group at Almaraz is considerable because, if one estimates a normal use of its power, this group could produce 4.650 billion KWh per year, a production which, if this powerplant did not exist, would require a consumption of about 1.1 million metric tons of fuel oil in a plant of this type. If we consider the fact that a ton of fuel oil requires the treatment of 2 tons of crude, we find that the operation of the No 1 nuclear group at Almaraz will involve a savings of 2.2 million metric tons of crude per year, a volume of oil equivalent to 16 million barrels which, at the present price, represents approximately $550 million. But, even when this figure is cut in half, owing to the rest of the products of the refining, and subtracting the cost of the charges of nuclear fuel, if imported, the net economy to the nation in foreign exchange (Jose Maria de Oriol claims) would amount to $250 million.

All of this causes us to regret, with the president of the government, Spain's delay in the construction of the necessary nuclear powerplants, lags resulting from the difficulties that have cropped up in their construction, and from the misgivings of those who, with their erroneous action, have delayed these nuclear projects.

With the official opening of the first group at the Almaraz nuclear powerplant by the president of the government and the minister of industry and energy, the way has been paved for putting into operation the second generation of nuclear powerplants in Spain which, once they are in service, will represent a power of 6,555 megawatts.

The importance of putting Almaraz I into service lies not only in the substitution of 1.3 million tons of crude per year, approximately 27 billion pesetas at the current oil prices, but also in the fact that Spanish technology and the Spanish companies engaged in the construction of capital goods for the nuclear powerplants have come of age.

At the present time there are three nuclear powerplants depositing kilowatts into the system: Santa Maria de Garona, Jose Cabrera and Vandellos I, which together bring a total of 1,100 megawatts of power and which comprise the so-called first generation of nuclear powerplants. These plants were contracted for through the "turn-key" system, which means that, actually, the Spanish participation in engineering and manufacture was limited essentially to the construction work. In the total project, the Spanish participation amounted to 42 percent.

With the second generation of nuclear powerplants, the two groups at Almaraz, those at Lemoniz and those at Asco, in addition to Cofrentes, the "turn-key" type of contracting has been abandoned, and the electric companies, with the cooperation of the

engineering firms, bear direct responsibility for the project. The technological training of Spanish industries and the quality control programs carried out have made it possible for the Spanish contribution in this second generation to amount to 70 percent of the total for the project. For the so-called third generation of nuclear powerplants, which include the groups at Trillo, Vandellos, Valdecaballeros, Sayago and Regodola, the initiation of companies with nuclear equipment for the manufacture of heavy components, as well as [words missing from text]

The Almaraz group,which has been officially opened, has a PWR reactor with Westinghouse technology, and a gross electric power of 930 MW. The preliminary authorization was granted in 1971, that for the construction on 29 October 1973 and the permit for provisional operation was issued on 13 October of last year. At the end of October the fuel was loaded and it reached criticality at that time. The period wherein it is anticipated that it can reach full power and supply a large volume of kilowatts to the system will be this summer. When the Almaraz nuclear powerplant is in full production, with an annual utilization of 6 million in power from each unit, it will supply 5.5 billion kilowatt hours to the system; which is equivalent to 1.3 million tons of oil per year, or to 13.750 billion cubic meters of water impounded per year.

This information gives a very clear idea of the enormous damage caused to the electric companies building Almaraz (HE, UE and CSE, in equal proportions); because the loss of nearly 3 years in the construction of the first group and, consequently, those caused to the construction of the second one, may be estimated at many billions of pesetas, if we reckon the fuel which the companies and the nation would have saved during that time.

The approximate cost of the two Almaraz groups will be on the order of 180 billion pesetas, and this powerplant is being constructed by Spanish Hydroelectric, Electric Union and the Sevillian Electricity Company, in proportions of a third, on their own account and at their own expense.

The Almaraz plant has been built in accordance with the practices, codes and standards that are in effect internationally for this type of facility. It has also incorporated the additional safety devices introduced by the authorities in the United States following the accident at the Three Mile Island powerplant.

The powerplant is beginning to deposit energy into the national electric system amounting to 400 KW, and it is expected that, in September, it will be generating electricity at the plant's total power. In 1982, the second unit, also for 932 MW, will go into operation.

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Oct. 15, 1981

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